

**Support for the Amendments**

New Claim 23 finds support in original Claim 1 and paragraph [0025] of the specification.

Claim 17 is cancelled solely to avoid paying additional claims fees and without prejudice as to the subject matter therein.

It is believed there is no possibility of new matter.

## **Remarks**

Claims 1-16 and 18-23 are in the case.

The present claims relate to the production of long chain olefins ( $C_{10+}$ ), particularly  $C_{12}$  and higher (i.e.,  $C_{12+}$ ) olefins which are important starting materials in the production of sulfonate surfactants. The olefins are used to alkylate aromatic hydrocarbons and the resultant alkyl aromatics are sulfonated to produce alkylaryl sulfonates.

In addition, the alcohols of long chain olefins have considerable commercial importance in a variety of applications, including detergents, soaps, surfactants, and freeze point depressants in lubricating oils.

In such applications, it is important that the olefins employed are substantially free of quaternary carbon atoms because materials containing quaternary carbon atoms are resistant to biodegradation. It is important that detergents, soaps, surfactants, etc. be more rather than less biodegradable, and decreasing the amount of quaternary carbon atoms in such products aids in this goal.

In view of the need to avoid the production of quaternary carbon atoms in the resultant olefin oligomers, typically feeds are used which are substantially free of iso-olefins such as iso-butylene and iso-amylene. This presents yet another problem in that one source of lower olefins in a modern integrated oil refinery is the unreacted effluent stream from the MTBE (methyl tertiary butyl ether) production unit, which stream inherently contains up to 5wt% of iso-butylene. Thus, existing oligomerization processes either avoid the use of the MTBE effluent feed or else require expensive purification steps to remove the iso-olefins.

**[0001]** The present inventors have surprisingly been found that when certain surface zeolites are used to oligomerize a lower olefin feed containing significant quantities of iso-olefins, such as the unreacted effluent from an MTBE unit, the  $C_{12+}$  product is substantially free of quaternary carbon atoms. Instead, it is found that any quaternary carbon-containing materials are concentrated in the  $C_8$  fraction, which can then be removed for use as a high-octane gasoline product. Although the reason for this desirable result is not fully understood, and without wishing to be bound by theory, it is believed that the size of the pores of said certain surface deactivated zeolites are such that, although iso-butylene can enter the pores to

react with, for example, n-butylene, the resultant branched C<sub>8</sub> oligomer is too large to access the pores for further reaction.

EP '310 does discuss C<sub>12+</sub> fractions (e.g., pg. 3, lines 29+). However, the presence of quarternary carbon atoms, as would result from oligomerization of isoolefins, is not discussed. The presence of isoolefins is also not discussed.

In view of the fact that the present invention is directed to solving a problem caused by the presence of isoolefins in feed, particularly a feed from the unreacted effluent of an MTBE unit, Applicant's believe that the failure of EP '310 to suggest the presence of isoolefins and also the failure to suggest the problem resulting from the presence of isoolefins means that this reference cannot fairly suggested the present claims. There is no reason why the features alleged to be inherent would *in fact* be inherent in the reference. The present specification teaches that isoolefins are usually not processed in such processes but rather it is n-olefins that are usually oligomerized in processes intending to produce C<sub>12+</sub>. Accordingly, obviousness is being found at one of the exact points of novelty of the present invention, without any evidence.

WO 93/16020 does not cure the defects of EP '310. The reference does not suggest the use of surface deactivated zeolites and also is completely silent on the amount of quarternary carbon in a C<sub>12+</sub> cut. There is no evidence that the properties of the products - e.g., a C<sub>12+</sub> or C<sub>12-</sub> cut - in WO '020 would be inherently similar to those presently claims.

Thus, neither reference fairly suggests the features alleged to be inherent. It is well-settled that the features alleged to be inherent must be inherent as of a certainty and not merely a possibility.

Furthermore, one of ordinary skill in the art would not combine the references because they use different catalysts - one uses surface deactivated zeolites and one uses zeolites that are not surface deactivated.

For these reasons, Applicant's respectfully request that the rejection under §103 be withdrawn.

There being no further issues, Applicant's believe the present case is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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Date

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